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ENGLISH CHURCH ARCHITECTURE OF THE MIDDLE AGES

ENGLISH CATHEDRALS

CANTERBURY — PETERBOROUGH — DURHAM—SALISBURY—LICHFIELD—LINCOLN—ELY—WELLS—WINCHESTER—GLOUCESTER—YORK—LONDON

By Mrs. S. VAN RENSSELAER. Illustrated with one hundred and fifty-four Drawings by JOSEPH PENNELL. Also with Plans and Diagrams. Fifth Edition, revised and corrected. Cloth, 20s. net

HANDBOOK OF ENGLISH CATHEDRALS

By Mrs. S. VAN RENSSELAER. Illustrated with Drawings by JOSEPH PENNELL. Also with Plans and Diagrams. Cloth, 10s. 6d. net

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T. FISHER UNWIN, LTD., LONDON

ENGLISH CHURCH ARCHITECTURE

OF THE MIDDLE AGES

AN ELEMENTARY HANDBOOK

By A. FREEMAN SMITH

For many years Art Master and Instructor in all Architectural Subjects in the Municipal School of Art, Birmingham

WITH TWELVE PLATES

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PREFACE

THE object of this little work is to give an outline of the leading characteristics of Gothic Architecture, as found in churches of the Middle Ages in England. And it is hoped that it may be found useful to those visiting those noble buildings, whose antiquity and inseparable connection with the history of the country in their growth and development, in addition to the highest purpose for which they were erected by the faithful followers of the Founder of the Christian Faith, entitle them to veneration and careful study in the realms of history, art, and religion.

Its purpose as a handbook is to explain the origin and use of some of the forms which are presented to the eye of the visitor to these ancient monuments, not as being the result of caprice, or mere æsthetic motives, but as

derived originally from a deep conviction of the living truth which their founders professed, and which they attempted to express in all their constructive work.

It is intended that the book may also be found useful as an elementary introduction to the study of Gothic Architecture through the many elaborate and exhaustive treatises which are published on the subject. To such students, literary study should be supplemented by personal acquaintance with buildings recognised as standards of excellence.

The Introduction deals with symbols as the motive of Gothic design. In the following pages the various periods of English Gothic are defined by their predominating forms and ornaments dating from the seventh to the sixteenth centuries. Simple examples have been chosen in order to avoid the confusion which might result from the choice of more complex illustrations.

In the preparation of the illustrations the works of Agincourt, Didron, Owen Jones, and the late Jethro A. Cossins, have been consulted

for those of Plate I. Of the remaining, Plate II., Fig. 5, and Plate V., Fig. 1, are from works of Parker and Rickman respectively. Five details are from photographs; the remainder are from original sketches and studies by the Author.

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CHRONOLOGY

THE popular classification of English Gothic Architecture divides the style into four periods, thus:

Norman - -	William I., 1066, to Richard	I., 1189.
Early English -	Richard I., 1189, to Edward	I., 1272.
Decorated -	Edward I., 1272, to Richard	II., 1377.
Perpendicular -	Richard II., 1377, to Edward	VI., 1547.

These terms are useful, but not sufficiently descriptive. They were superseded by the late Edmund Sharpe's "Seven Periods," the terms of which are derived from the forms of the windows and their tracery, but are applicable to other details.

SHARPE'S "SEVEN PERIODS."

Saxon - - - -	1066.
Norman - - - -	1066 to 1145.
Transitional - - -	1145 „ 1190.
Lancet - - - -	1190 „ 1245.
Geometrical - - -	1245 „ 1315.
Curvilinear - - -	1315 „ 1360.
Rectilinear - - -	1360 „ 1550.

PLATE I

BYZANTINE AND EARLY CHRISTIAN

A Chapel in the Catacombs Rome
Early Christian
First Four Centuries A.D.
1
The traditional hidden Church
The Crypt of Berkswell - Church near Coventry.
Norman Twelfth Century
2
The Circle
3
Symbol of Eternity
3A
Sacred Monogram
4 Marble Pavement (Constantinople) With the Chevron
The Vesica Piscis
fish-bladder
The Aureole or Glory surrounding the figure of Christ or a saint
5
The Trefoil
6
7
Sacred Symbols
The Trinity
8
The Quatrefoil
9
The Four Evangelists
10
Sacred Symbol
11
The Fish (Ichthys. Greek)
From the Catacombs
12
Byzantine Ornament
The Triquetra
Ornamental arrangement of Symbols
I. Iota = Jesus
X. Chi = Christ
Θ. Theta = (Theos) = God
Y. Upsilon = Uios = Son
Σ. Sigma = Sōtēr = Saviour
THE LABARUM
CONSTANTINE'S STANDARD
Fourth Century
X or + Chi
P = Rho
CHRIST
13
Byzantine Capital from Santa Sophia Constantinople
14
From the Bronze Doors of The Basilica of The Nativity Bethlehem. Early Christian
15
16
Also called the Chrism
A.J.

PLATE I

English Church Architecture of the Middle Ages

INTRODUCTION

Plate I

BYZANTINE AND EARLY CHRISTIAN

THE term Gothic was applied originally as one of contempt in the fifteenth century by the architects of the Renaissance, who attempted to reproduce the ancient architecture of Rome, and considered Mediæval Art, which had ruled all departments of design throughout Europe during the three preceding centuries, to be no better than the invention of the Barbarians, the Goths, and the Vandals, who overran the Roman Empire in the fourth century. During the three previous centuries the persecuted converts to Christianity were driven to take refuge in any hiding-place available. In Rome they descended to the *Catacombs*, the underground workings of the ancient Roman stone quarries, consisting of narrow,

low passages, their aggregate lengths amounting to hundreds of miles. There they quarried out of the rock their chambers for assembly, where they gathered for worship in the light of torches or lamps, and excavated recesses for the burial of their dead. These chambers were imitated in the form of the *Crypts* (hidden chambers) existing under some churches and cathedrals. (Compare Plate I., Figs. 1 and 2.) The walls of the catacombs have rude incised inscriptions and carvings revealing the Christian Faith by symbols, such as the *cross*, suggesting the Crucifixion—the emblem of sacrifice ; the *circle*, the line without end, the symbol of Eternity (Plate I., Fig. 3) ; the *triangle*, *trefoil*, and *triquetra*, symbols of the Trinity (Figs. 6, 7, and 8); the *quatrefoil* of the four evangelists (Figs. 9 and 10). The *fish* was adopted as a symbol of the Redeemer, because the letters of the Greek word *icthys*, when used as an acrostic, gave the initials of the words—Jesus, Christ, God, Son, Saviour (Plate I., Fig. 11). This symbol was extensively adopted in the decoration of baptismal fonts.

The *Vesica piscis* (Latin, the bladder of a fish) (Plate I., Fig. 5) was used as a nimbus or

glory to surround the figure of a sacred personage in sculpture and in painting. Its name shows the use of Latin terms in the Roman Church as distinguished from the Greek in *Byzantium*, which was an ancient Greek city adopted by Constantine, the Christian Emperor, as the capital of the eastern division of the Roman Empire under the new name of Constantinopolis—the modern Constantinople. But the term "Byzantine" has been retained in matters relating to art. Plate I., Figs. 15 and 16, show the Greek Cross, which is a version of the Greek letter *chi* combined with the letter *rho* (similar to the English *P*). This symbol represented the name Christ, and was the *Christian standard, the Labarum*, chosen by the Emperor Constantine.

Plate I., 3A. The sacred monogram generally found in church decoration stands for the Latin phrase *Jesus hominum Salvator*—"Jesus, the Saviour of men." The Greek letters IHS (*iota, eta, sigma*) gave the first three letters of the name *Jesus*.

In the plan of an English cathedral or cruciform church, the symbol of the Latin Cross is made the basis of its form (Plate XI., Fig. 1).

(The *Byzantine* or Greek Cross has the four limbs of equal length.) The Nave, N. (Latin, *navis*, a ship, a symbol of the Church), is built from west to east. The Choir or Chancel, which is screened off by a *Cancellum* or lattice, is in continuation of the Nave to the east end. This in some cathedrals includes the Lady Chapel, which was in mediæval times dedicated to the Virgin Mary.

In several churches and some cathedrals the head of the Cross, the Chancel or Choir, is not in line with the Nave, but is slightly inclined to one side—not in all cases the same side. Two explanations are given for this, one being its *orientation—i.e.*, the axis of its length points to the rising of the sun on the day of its foundation, which does not coincide with that of the Nave, the Chancel having been commenced at an earlier or later date and different season of the year. The other theory is that it symbolises the head of Christ falling on one side in death.

Plate I., Fig. 14 (from the "Grammar of Ornament"), shows an ornamental design composed entirely of early Christian symbols. Plate I., Figs. 12 and 13, carved ornament and

a capital bearing crude resemblance to an ancient Ionic capital. Both Figs. 12 and 13 are under the influence of Greek and Roman Art without reference to symbolism.

Plate I., Fig. 4, shows a *chevron* (a French military ornament), a decoration dating back to ancient Egypt, where it symbolised the waves of the Nile, and was adopted in many later periods, and became conspicuous in the Norman arches of English architecture.

PLATE II

ANGLO-SAXON

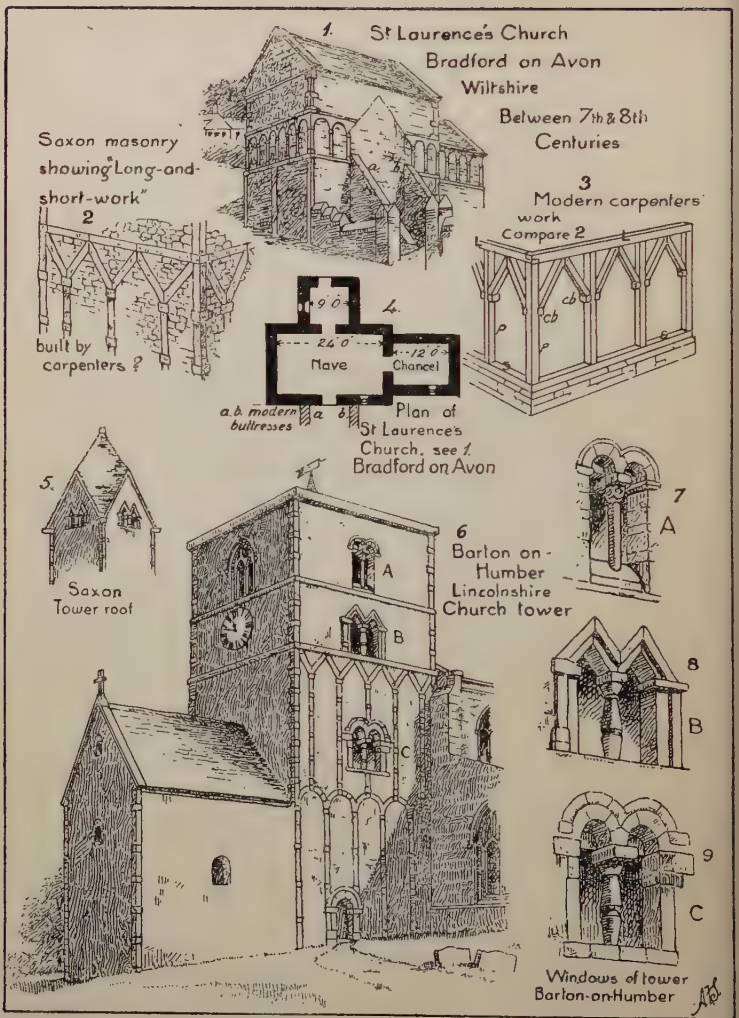

1. St Laurence's Church
Bradford on Avon
Wiltshire
Between 7th & 8th
Centuries
Saxon masonry
showing "Long-and-
short-work"
2
built by
carpenters ?
3
Modern carpenters'
work
Compare 2
24'0"
12'0"
9'0"
Nave
Chancel
a.b. modern
buttresses
Plan of
St Laurence's
Church, see 1.
Bradford on Avon
5.
Saxon
Tower roof
6
Barton on-
Humber
Lincolnshire
Church tower
A
B
C
7
A
8
B
9
C
Windows of tower
Barton-on-Humber

PLATE II

Plate II

ANGLO-SAXON

THERE can be no doubt that Christianity found its way into Britain early during the Roman occupation, but was suppressed through the violent persecutions by the Pagan tribes who ruled following the Roman departure A.D. 410, to be revived and further developed after the mission of St. Augustine, A.D. 597, from Rome to the Anglo-Saxons, who occupied Britain between the fifth and eleventh centuries.

The church of Greenstead, in Essex, is one of the most ancient in the country, and was built by Anglo-Saxons. Its walls are of substantial logs of timber placed upright upon a foundation of rude stonework. This method appears to be a survival of their method of building their dwellings.

Of stone buildings, the church tower of Barton-on-Humber (Plate II., Fig. 6) is a good example of Anglo-Saxon work. In it the ex-

ternal angles of the tower and of the door and window openings have their *quoins* (corner stones) of *"long-and-short" work*, the name applied to Saxon masonry of this kind, in which long stones are placed on end with short stones laid flat, suggesting their origin to be the work of carpenters who would place timbers in such positions, contrasted with that of masons, who would place all stones horizontally or at right-angles to pressure.

In this example and the very fine one at Earls Barton, Northamptonshire, this "long-and-short" work is carried over the exterior of the wall as a kind of surface decoration.

Plate II., Fig. 3, shows the present-day manner of framing timbers in a partition with *sill* (s.), posts or *studs* (p.), lintel (l.), inclined *struts*, and *corbel-blocks* (c.b.).

Saxon timber framing would be on similar lines, and this manner was perpetuated traditionally in their stone walls. The practice of imitating woodwork in stone and vice versa is one to be found in the works of all ages from remote antiquity. The heads of Saxon door and window openings were either semicircular (Plate II., Figs. 7, 8, and 9) or formed by placing

two stones inclined to each other thus—Λ, and a short column or rude baluster was sometimes placed between two windows.

[*Note.*—The window over the clock face (Plate II., Fig. 6) is an insertion of a later period.]

The interesting little church at Bradford-on-Avon, Wiltshire, shows the same manner of building (Plate II., Fig. 1).

Anglo-Saxon bell-towers appear to have been generally covered with a roof of the form shown in Plate II., Fig. 5, as at Sompting, Sussex.

PLATE III

NORMAN, 1066–1189

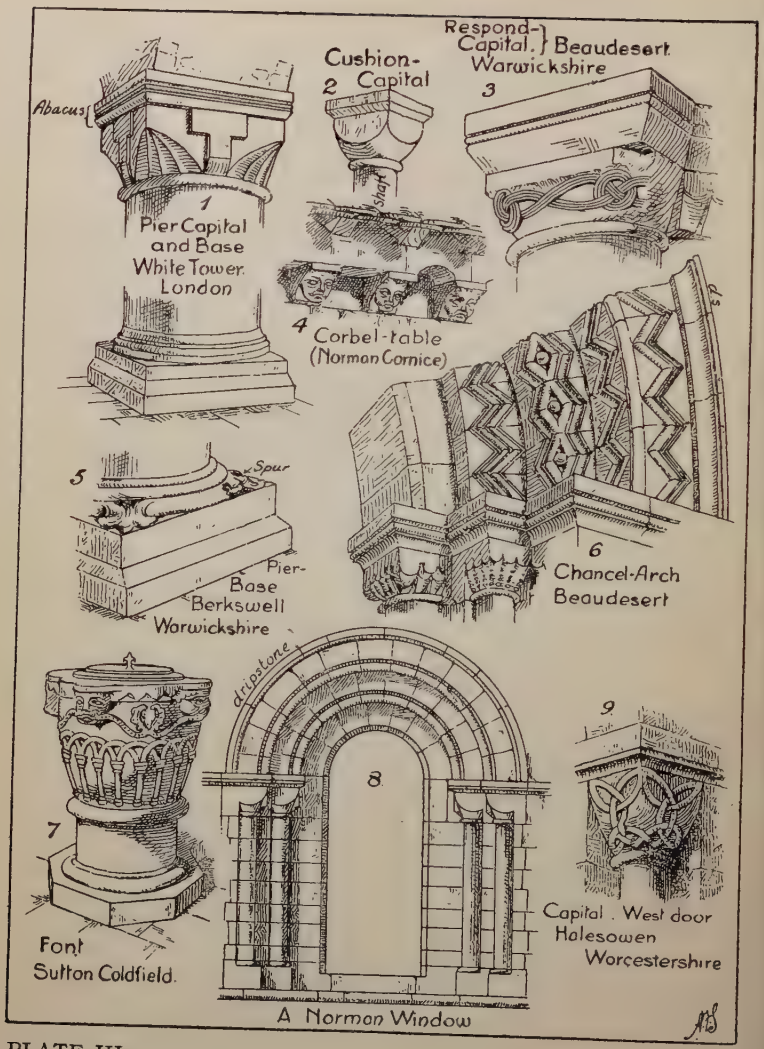

Abacus
1
Pier Capital and Base White Tower. London
Cushion-Capital
2
Shaft
Respond-Capital. } Beaudesert Warwickshire
3
4 Corbel-table (Norman Cornice)
5
Spur
Pier-Base Berkswell Warwickshire
6
Chancel-Arch Beaudesert
7
Font Sutton Coldfield.
dripstone
8
A Norman Window
9
Capital . West door Holesowen Worcestershire

PLATE III

Plate III

NORMAN, 1066–1189

THE Norman period dates from A.D. 1066, though the Norman manner of building had been adopted after the year 1000, when church building was revived after suspension in anticipation of the Millennium, which was expected to bring the end of the world. That dreaded year having safely passed, church building was vigorously revived. Timber construction had led to frequent disaster by fire, and as larger buildings were now required, better construction became imperative. Masonry must supersede carpentry in wall construction, and the necessary skilled labour came from Normandy.

The influx of superior talent following the Norman Conquest resulted in great improvement in every department of building. Stately *cathedrals* were founded, each for the reception of the *cathedra* or throne of the bishop. Abbeys

and monasteries and parish churches for the clergy were built throughout the land, as proved by the existence of Norman work in most parts of the country.

Every period of English Gothic architecture has certain forms appearing in the general composition and details which help to fix the period to which they belong. In the Norman the *square* and the *circle*, the right angle and the semicircle, are the prevailing figures suggestive of strength and severity so evident in the impressive naves of Ely, Peterborough, Norwich, Gloucester, Tewkesbury, and the fortress-like cathedral of Durham.

Plate III. gives a few details of work of the Norman period. The term *pier* (Plate III., Fig. 1) defines the pillars or masses of masonry supporting the arches between the nave and aisles of a church. This example (Plate III., Fig. 1), from St. John's Chapel in the White Tower of London, William the Conqueror's residence, is circular with a square capital chamfered down to the circular pier, and has a slightly moulded *abacus* (the crowning moulding of a capital).

Plate III., Fig. 2, the *cushion capital*, is the

simplest kind of Norman capital. It is cubical, with its square faces rounded down to the shaft.

[*Note.*—The *shafts* of all English Gothic columns are cylindrical—*i.e.*, without any diminution towards the top, in contrast with Greek and Roman shafts, which are always diminished.]

Plate III., Fig. 3, is the capital of a *respond*—a half-column attached to a wall and carrying an arch or part of a roof.

Plate III., Fig. 4, the *corbel-table*, or cornice underneath the eaves of a roof (*corbel*—a bracket).

Plate III., Fig. 5, the *base* of a pier with *spur* ornaments.

Plate III., Fig. 6, fragment of a Norman arch of *four orders*, each order being a separate arch, three of which are enriched with the Norman *chevron*. The *dripstone* or *hood-moulding* (d.s.) encloses the arch as in Plate III., Fig. 8, though its original function—to protect the moulding under it from weather—is not needed here, but it is generally introduced to give effective finish to the arch. The capitals in this group are *scallop capitals*. A small portion

of a similar capital is shown at the right hand of Plate III., Fig. 3.

Plate III., Fig. 7, is a Norman font of the simple bowl form enriched with carved Norman heads connected by Byzantine ornament and surrounded with a *Norman arcade* of intersecting arches—a feature often introduced in the walls of churches and cathedrals.

Plate III., Fig. 8, is a double-recessed window with an arch of three orders. The columns in the positions shown are called *jamb-shafts* or *nook-shafts;* those on the right are *detached* and may be removed, leaving the bases and capitals remaining. On the left the shafts are *engaged*—*i.e.*, form part of the masonry of the wall. These two varieties are never found together as here, but are thus shown for convenience. The capitals are a variety of the cushion capital.

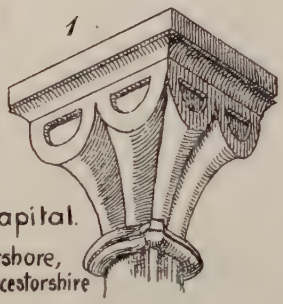
Plate III., Fig. 9, is a *cushion capital* with the *triquetra* symbol of the Trinity (Plate I., Fig. 8).

Byzantine influence is evident in the ornament of the capitals (Plate III., Figs. 1, 3, and 9), in the chevron (Plate III., Fig. 6), and the decoration of the font (Plate III., Fig. 7).

Norman walls depended for their strength upon their thickness, with the slight addition at intervals, where lateral pressure occurred, of thin pilaster-like buttresses projecting only a few inches equally from bottom to top.

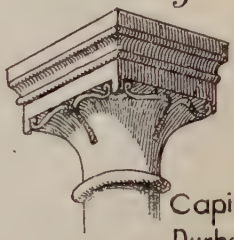
PLATE IV

TRANSITIONAL, 1145–1190
(NORMAN TO EARLY ENGLISH)



1

Capital.
Pershore,
Worcestorshire



3

Capital
Durham

2

Arcade

4

Note-Figs. 1·2·3·4
are Transitional.
from Norman to.
Early English
1145 - 1190

PLATE IV

Plate IV

TRANSITIONAL, 1145–1190

THE period of Transition from Norman to Early English dates from 1145 to 1190, in the reigns of Stephen and Richard I., the period when architecture gradually passed from the massiveness and severity of Romanesque, as expressed in the Norman, to the delicate refinement of Early English Gothic. In its general character there is much that is common to both periods. It is easily distinguished in its details as capitals, arches, carving, etc.

Plate IV., Figs. 1 and 3, show Transitional capitals in which the square abacus of the Norman remains and the concave surface of the body or bell contrasts with the convex of the Norman (Plate III., Figs. 2, 3, 6, and 9). Rude carving suggestive of foliage was sometimes introduced. The placing of two pointed arches under a semicircle (Plate IV., Fig. 2) is especially indicative of the Transitional period.

In the Transitional period the *pointed* or *Gothic arch* was first introduced, and established as the most characteristic feature of the Gothic style on account of its superior strength and fitness. In the Transition, hollows were introduced separating the rounds in mouldings (Plate IV., Fig. 4). In other respects Transitional work differs little from Norman.

PLATE V

EARLY ENGLISH

LANCET, 1190–1245
GEOMETRICAL, 1245–1315

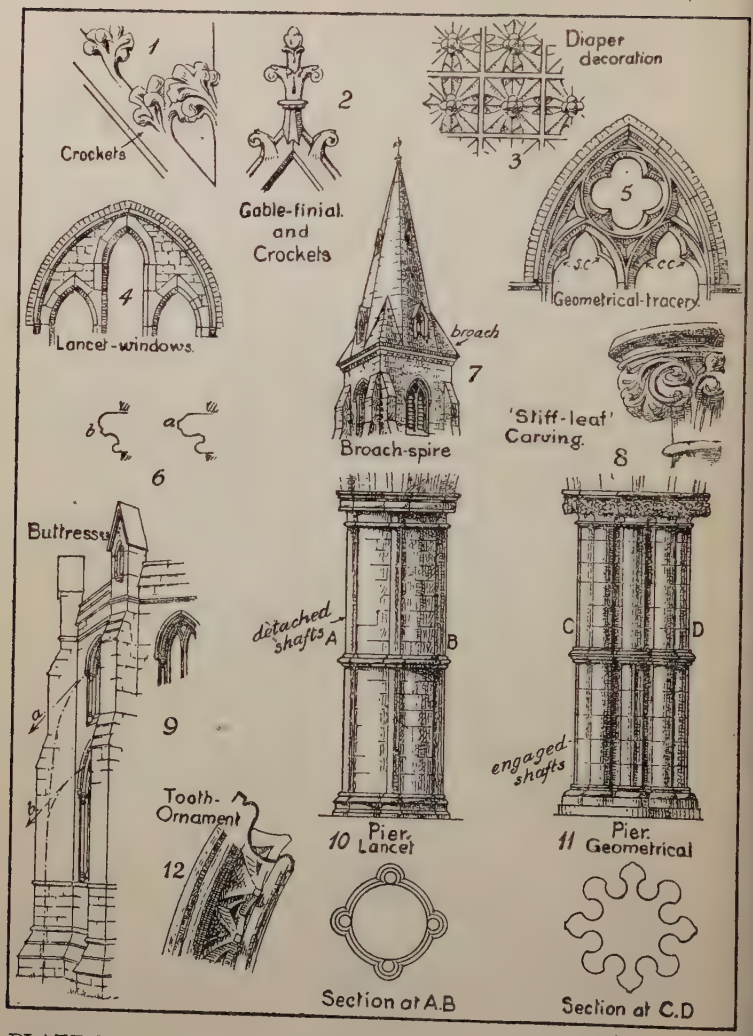

1
Crockets
2
Gable-finial and Crockets
Diaper decoration
3
5
Geometrical-tracery.
4
Lancet-windows.
broach
7
Broach-spire
'Stiff-leaf' Carving.
8
6
b
a
Buttresses
9
a
b
detached shafts
A
B
C
D
engaged shafts
Tooth-Ornament
12
10 Pier. Lancet
11 Pier. Geometrical
Section at A.B
Section at C.D

PLATE V

Plate V

EARLY ENGLISH, 1189–1272

IN the Early English period knowledge of the true principles of architectural design and construction advanced considerably—mouldings and carving attained the highest refinement, and the work of the Early English period is admitted to be the purest of the Gothic style.

Improved scientific construction is most evident in the walls. The development of stone-vaulted roofs (a protection against fire) carried by arched ribs brought down the incumbent load on to the walls, producing thrusts upon them which had to be provided against. The old manner of making the wall of great thickness was wasteful and unsatisfactory. The happy idea of the Gothic *buttress* fulfilled all the requirements, and produced one of the most beautiful features of the Gothic style. It was built in diminishing stages, its outline enclosing the graceful parabolic curve of nature

—the path of the combined thrusts and their opposing reactions. This structure was carried to perfection when combined with the *flying-buttress* (Plate VII., Fig. 10), which conducted the thrust from the lofty wall of the nave over the external roof of the aisle by an arch on the *wall-buttress*, which was strengthened to do its work by the addition of a heavy *pinnacle*. Plate V., Fig. 9, from Lichfield Cathedral, shows two buttresses of the Lancet period built to meet the thrust of the ribs carrying the vaulting of the Chapter-house and Library over. In one of these the approximate direction of the thrusts is indicated by the arrows *a*, *b*, which, if unopposed, would cause a collapse; the ultimate deflection of their path by the weight of the superincumbent masonry is indicated by dotted lines within the *buttress*, thereby producing equilibrium through the opposing resistance from the foundations along the same path.

In Plate V., Figs. 10 and 11, the piers had columns surrounding them whose shafts in the Lancet period were *detached*, but connected at their extremities by moulded *stone bands* (A, B), and at the bases and capitals. These

piers were sometimes carried to a great height, as those in Westminster Abbey, which have three of these *stone bands* in their height. In the Geometrical period the shafts formed part of the main pier, were not detached, and resembled mouldings (Plate V., Fig. 11). Such shafts were described as *engaged.*

Plate V., Fig. 7, shows a tower with a *broach-spire* belonging to the Early English period. In the figure the four broaches are the small pyramids covering the *squinch arches* or *squinch corbels*, which carried four of the eight sides of the octagonal spire across the angles of the tower.

Plate V., Fig. 4, shows three *Lancet windows* under a single arch or dripstone. This grouping of the windows soon suggested the design of tracery windows, in which the lights are separated by *mullions*, the simplest form being as represented in the Lichfield Chapter-house in Plate V., Fig. 9. Geometrical arrangements were invented from the simple one (Plate V., Fig. 5) to the elaborate windows and arcades of Westminster Abbey. Cusps (*spear points*) were formed in the tracery, the *Soffit-cusp* (s.c.) projecting from the underside of the mullion,

indicating early work and uncommon. All other cusps were worked on the *chamfer* (c.c.), their points being variously shaped.

In Plate V., Fig. 8, the capitals were either moulded, or carved with *stiff-leaf foliage*, being *conventional—i.e.*, designed on natural principles, but not in imitation of nature, and sometimes of great beauty, but never so delicate as to suggest its unsuitability to the material in which it was wrought. Hollows in the arch and other mouldings were enriched with the *tooth ornament* (Plate V., Fig. 12), which occurs in the Lancet period only.

Plate V., Fig. 2, shows the decoration of gables with *crockets* and *finial*.

Plate V., Fig. 3, shows *diaper* ornaments used in wall decoration.

Plate V., Fig. 6, shows a *string course* and *dripstone*. All mouldings consist of large rounds and deep hollows, separated by fillets (a, b), and are frequently arranged in extensive groups, as in doorways, arcading, etc.

The Cathedral of Salisbury is the only one which is throughout belonging to the Early English period.

PLATE VI

DECORATED, 1272–1377

GEOMETRICAL, 1245–1315
CURVILINEAR, 1315–1360

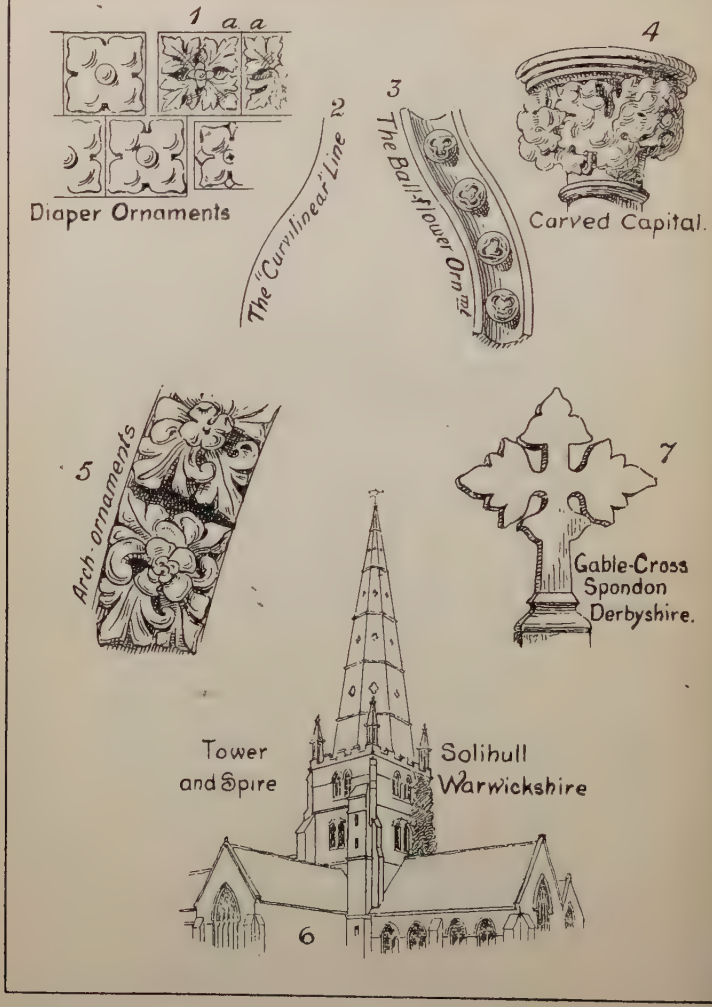

1 a a
Diaper Ornaments
2
The "Curvilinear" Line
3
The Ball-flower Ornament
4
Carved Capital.
5
Arch-ornaments
7
Gable-Cross
Spondon
Derbyshire.
Tower
and Spire
Solihull
Warwickshire
6

PLATE VI

PLATE VII

DECORATED, 1272–1377

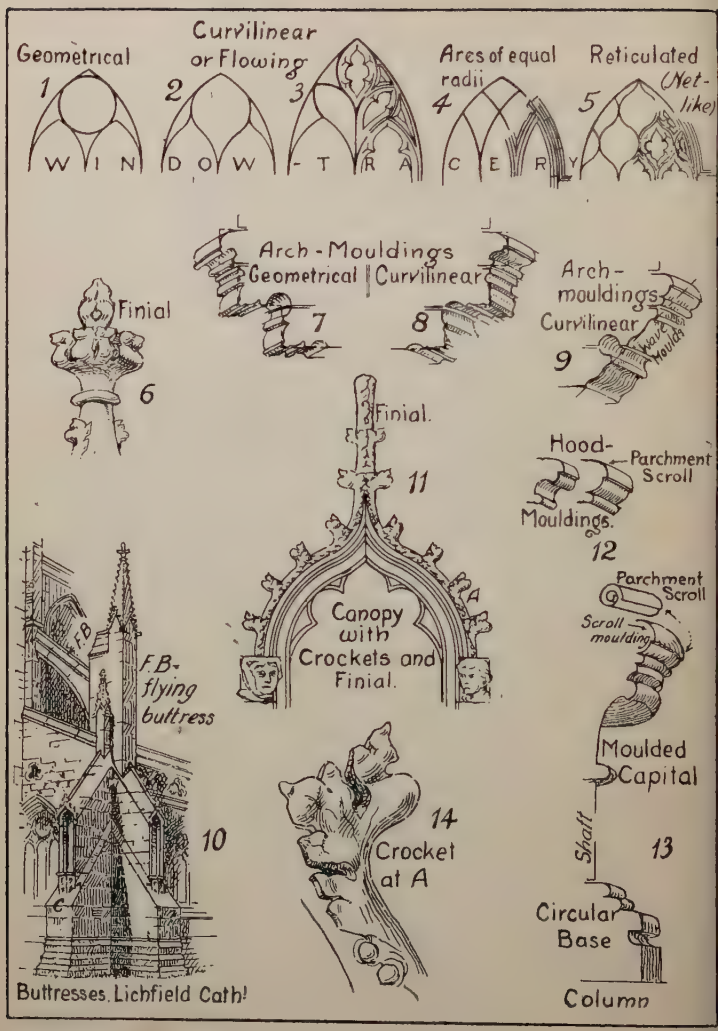

Geometrical
1
W I N
Curvilinear or Flowing
2
D O W
3
- T R A
Ares of equal radii
4
C E R Y
Reticulated (Net-like)
5
Arch-Mouldings
Geometrical
Curvilinear
7
8
Finial
6
Arch-mouldings
Curvilinear
9
Hood-Mould
Finial.
11
Hood-Mouldings.
Parchment Scroll
12
Canopy with Crockets and Finial.
A
F.B.
F.B.- flying buttress
10
Buttresses. Lichfield Cath!
14
Crocket at A
Parchment Scroll
Scroll moulding
Moulded Capital
Shaft
13
Circular Base
Column

PLATE VII

Plates VI and VII

DECORATED, 1272–1377; GEOMETRICAL, 1245–1315; CURVILINEAR, 1315-1360

THE term "decorated" is applied to the work of this period because of the superfluity of its ornaments. Almost every feature was enriched with carved ornament. The predominating form is the *curvilinear* line, the *ogee* or *ogival* (Plate VI., Fig. 2), Hogarth's "line of beauty and grace," which occurs in the lines of tracery, the shape of arches, sections of mouldings, and of foliated ornament.

The Geometrical period, 1245-1315, is the overlapping of Early English and Decorated. The term Geometrical is applied on account of the window tracery, which is made up of circles and triangles more or less elaborate. The change from *Geometrical* to *Curvilinear* or *flowing* tracery is demonstrated in Plate VII., Figs. 1, 2; Plate VII., Fig. 2, being a slight alteration of Plate VII., Fig. 1.

Plate VII., Fig. 5, *reticulated—net-like*—is a common example produced in the same manner as Plate VII., Fig. 2, and is adaptable to all shapes of windows. Many elaborate and beautiful designs were produced on these principles by extension of such elements as in Plate VII., Fig. 3.

Plate VII., Fig. 4, is a common type of window; an extension of the simple two-light window (Plate V., Fig. 9), frequently enriched with cusps and ball-flower (Plate VI., Fig. 3) in the hollows of the mullions.

In Plate VII., Fig. 10, the buttresses are decorated with niches for statuary. A *flying-buttress* is shown (F.B.), carrying the thrust of the stone-vaulted roof of the nave over the external roof of the aisle into the main buttress, whose weight and consequent stability are increased by the heavy *pinnacle.* The smaller buttress (C.) resists the thrust of the window arches. Norwich Cathedral displays an interesting array of flying-buttresses.

Plate VI., Fig. 6, shows a tower and spire at the crossing of nave and transepts. The base of the spire and its *broaches* (Plate V., Fig. 7) are concealed by a *parapet wall*, with battle-

ments protecting a footway round the spire, which could be used as a place of observation. Mouldings in the Geometrical period attained the greatest refinement. Many can be favourably compared with those of the best Greek periods.

Arches continued to be built in square orders (Plate III., Figs. 6 and 8), and consisted of round mouldings, generally separated by deep hollows and fillets (Plate VII., Fig. 7).

In mouldings of the Curvilinear period (Plate VII., Fig. 8) the *ogee* superseded the round, and the hollows were shallower. Towards the end of the period the square *orders* ceased, and the planes of the *orders* were at about 45° with the vertical (Plate VII., Fig. 9 ; compare with Plate VIII., Fig. 12).

The *wave-moulding* (Plate VII., Fig. 9) and the *scroll-moulding* (Plate VII., Figs. 9, 12, and 13), supposed to resemble a parchment scroll, are conspicuous in the Curvilinear. The general character of the ornament is indicated on Plate VII., in most of which the *ogee* line is apparent.

The *ball-flower* (Plate VI., Fig. 3) is a dis-

tinctive feature of the Decorated period superseding the tooth ornament of the Lancet (Plate V., Fig. 12). It was applied to hollow mouldings of arches and tracery of windows, vaulting, and spires.

Capitals were moulded as in the section (Plate VII., Fig. 13), or carved, as Plate VI., Fig. 4, generally in imitation of natural foliage, varying from a bold conventionalism (Plate VI., Fig. 5) to a close imitation of nature, as Plate VI., Fig. 1 (a.a.). Animal forms and small human figures were occasionally introduced. Figure sculpture reached its highest degree of excellence in this period.

Construction was further advanced, but in design the climax had been attained in the Geometrical period, and a very gradual decline set in, as shown in excessive ornamentation and literal imitation of natural forms in stonework, which is unsuitable for such delicate treatment on account of its fragility.

The increasing wealth of the nation during this period is indicated by the grandeur of the buildings and the redundancy of ornament.

PLATE VIII

PERPENDICULAR, 1377–1547
RECTILINEAR, 1360–1550

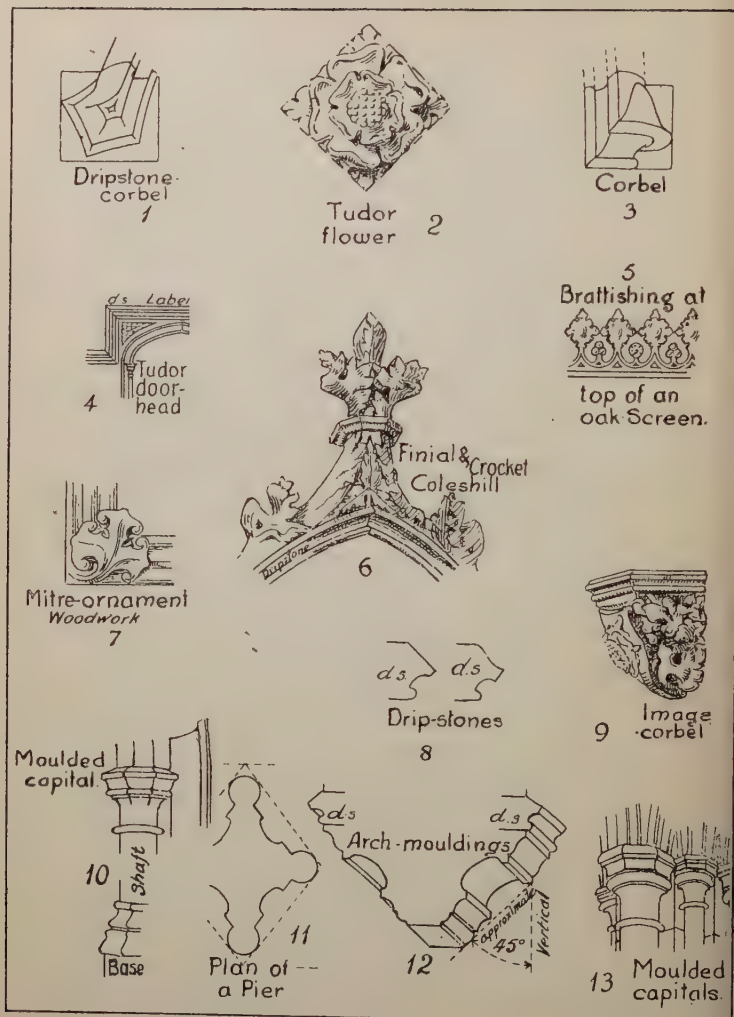

Dripstone-corbel 1
Tudor flower 2
Corbel 3
d.s Label
Tudor door-head 4
5 Brattishing at top of an oak Screen.
Finial & Crocket
Coleshill
Dripstone
6
Mitre-ornament
Woodwork
7
d.s d.s
Drip-stones 8
Image corbel 9
Moulded capital
10
Shaft
Base
11
Plan of a Pier
d.s
d.s
Arch-mouldings
Approximately 45° Vertical
12
13 Moulded capitals.

PLATE VIII

PLATE IX

PERPENDICULAR

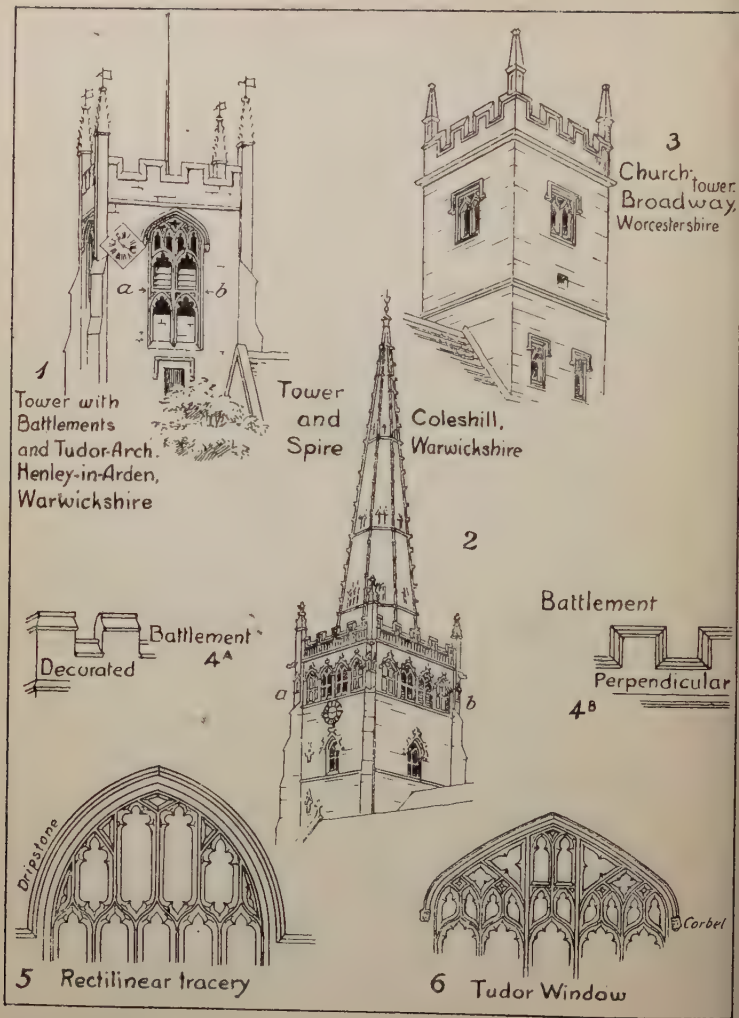

1
Tower with Battlements and Tudor-Arch. Henley-in-Arden, Warwickshire
a
b
3
Church tower Broadway, Worcestershire
Tower and Spire
Coleshill, Warwickshire
2
a
b
Battlement
Decorated
4A
Battlement
Perpendicular
4B
Dripstone
5 Rectilinear tracery
Corbel
6 Tudor Window

PLATE IX

Plates VIII and IX

PERPENDICULAR, 1377–1547
RECTILINEAR, 1360–1550

THE term "perpendicular" was applied to the work of this period, the last of English Gothic, on account of the predominance of vertical lines in the whole architectural design, and especially in window tracery.

A comparison of Plate VII., Fig. 5, net tracery, with Plate IX., Fig. 5, rectilinear, will explain how the latter was developed from the former by extending the sides of the *meshes* of the *net* by straight lines into the summit of the window. But as the term *perpendicular* is only a *relative* one, not necessarily meaning vertical, the term *rectilinear* was substituted, being descriptive of the general character of the whole design in mass and detail. In this work, however, the term "perpendicular" is preferred as the one most generally known. Windows became so large, chiefly for the

display of stained glass, as to reduce the wall spaces between them to little more than piers, and *transoms* (horizontal mullions) had to be introduced to strengthen the vertical *mullions*. [See Plate IX., Figs. 1 and 2 (a.b.), belfry windows in these examples.]

Loftiness is a special trait of the Perpendicular period. Walls were carried to a greater height than previously. The external roof was frequently covered with lead, and inclined at an angle easy to walk upon. The roof-timbers were supported by ornamental principals exposed to view from the interior, or there was a stone-vaulted internal roof of rich design, the increased thrusts upon the walls being counteracted by larger buttresses.

Tall towers were built, such as those of York Minster, Gloucester, Worcester, and the churches of Boston (Lincolnshire), Wrexham, Taunton, and many others of magnificence. Plate IX., Figs. 1 and 3, give varieties of smaller parish church towers. In these the Tudor arch and square-headed window are shown. Spires are not so common as in the preceding periods. *Buttresses* were placed *diagonally* at

all corners, scientifically the best position (Plate IX., Figs. 1 and 2).

In large churches external wall surfaces were enriched with panelling, covering in some cases the whole from ground to summit, and combined with open tracery in the battlements. In the interior the same kind of decoration prevailed, and in some cases the window tracery was carried below the glass down to the floor as panelling.

Plate IX., Figs. 4A and 4B, gives the comparative shape of *battlements*.

Arch-mouldings (Plate VIII., Fig. 12) generally included the large hollow also common in the window jambs. The plane of the arch-mouldings was inclined to the vertical 45° (Plate VIII., Fig. 12). The usual dripstone (d.s.) and some of their *corbels* are shown in Plate VIII., Figs. 1 and 3. Piers (Plate VIII., Fig. 11) were of the simple form shown with columns at the angles, single, or in groups, as Plate VIII., Fig. 13, the general contour of the pier being a rhombus or lozenge in plan.

The *ogee* arch with crockets and finial was continued from the Decorated period.

The *Tudor* or *four-centred* arch (Plate IX., Figs. 1 and 6) belongs to the late Perpendicular period.

Plate VIII., Fig. 4, shows a common form of Tudor door-head with the *label* or *square dripstone* and carved *spandril* (a triangular space). Columns were circular, with octagonal bases and capitals, the latter moulded or carved with oak-leaf foliage or conventional ornament, resembling that in Plate VIII., Fig. 9. Corbels with shields (Plate VIII., Fig. 9), armorial bearings, and the Tudor rose (Plate VIII., Fig. 2), frequently occur.

Many Perpendicular churches are rich in ornamental woodwork: choir stalls with lifting seats (misereres), under which are grotesque carvings; poppy-heads (Fr. *poupée*, a doll), the bench-end ornaments which sometimes carried a small carved figure among foliage; panelled screens crowned with brattishing (Plate VIII., Fig. 5), and other ornaments. The term *brattishing* is also applied to the open tracery of some battlements of the Perpendicular period.

The Perpendicular is the longest of the English Gothic periods. In it Gothic con-

struction attained its climax; ornamentation declined from a refined realism to coarse conventionalism, coinciding with the decline of spiritual life in the Church. Cathedrals and churches increased in all dimensions, and everything showed the tendency towards the renaissance of classic art which was flourishing on the Continent. Classic mouldings were imitated, and carved ornament of pure Italian design was applied to decorate Gothic forms—notable instances being the tomb of Henry VII. in Westminster Abbey, and the Salisbury Chantry in Christchurch Priory near Bournemouth. Both were the work of Torregiano, a contemporary of Michael Angelo.

The English people clung to their Gothic style for a century after the same had almost disappeared from the Continent, and in the Elizabethan period, 1558-1603, classic details, including the *five orders*, were completely incorporated into Gothic design. The pointed arch disappeared; the Roman semicircle took its place. Brickwork superseded masonry, roof construction was concealed, and all kinds of shams were introduced. Then came a period of close imitation of Greek and Roman temples,

until the Gothic revival under its pioneer, A. W. Pugin (*b.* 1812, *d.* 1852), whose literary works are very instructive and interesting reading. The present-day (1922) tendency is towards a revival of Byzantine architecture.

PLATE X

ENGLISH GOTHIC ROOFS

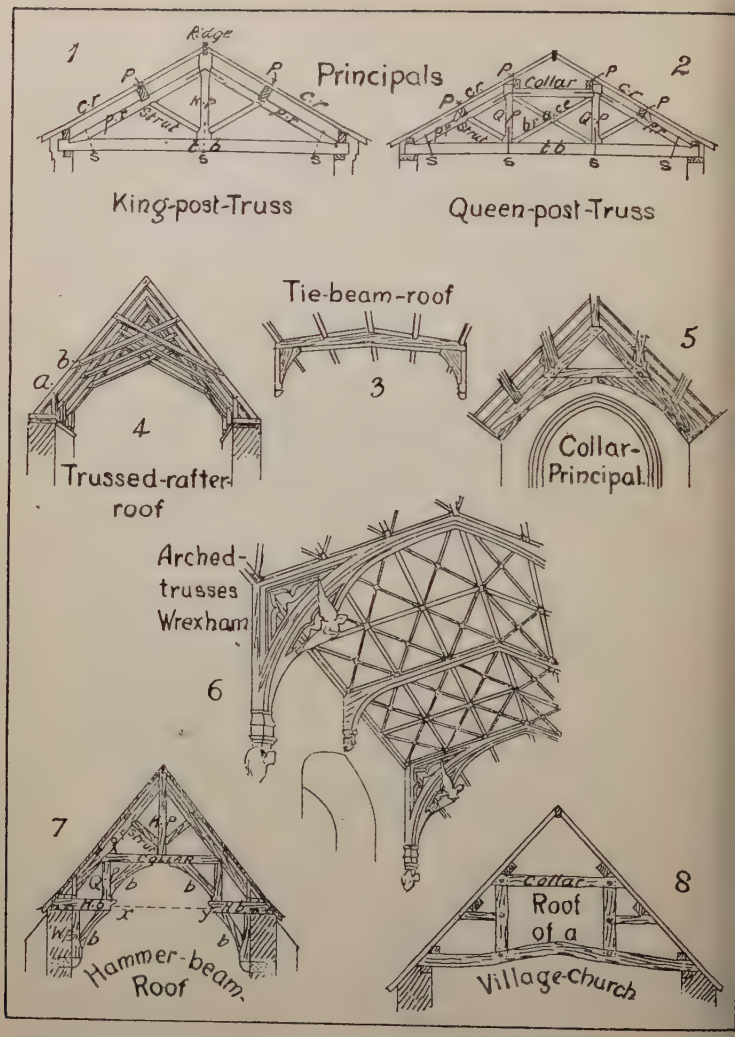

Principals
1
Ridge
Strut
King-post-Truss
2
Collar
Queen-post-Truss
Tie-beam-roof
3
4
Trussed-rafter-roof
5
Collar-Principal
Arched-trusses Wrexham
6
7
Hammer-beam-Roof
8
Collar
Roof of a Village-church

PLATE X

Plate X

ENGLISH GOTHIC ROOFS

NEXT in importance to the construction of substantial walls comes the necessity of weather-proof and storm-proof roofs, such as should preserve the stability of the walls, or their disintegration would be hastened by that which should be their protection.

The nature of the covering and the action of weather are the principal factors affecting their design and construction. The rigours of the English climate require a covering to be such as to prevent the penetration of rain, and their support to be strong enough to resist the pressure of snow and the hurricane. The high-pitched roof (of steep inclination) is common to all periods of English Gothic. The average Norman roof was *pitched* about 45°, its apex being about a right angle composed agreeably with the semicircular arches in the gables. The higher-pitched roofs came simultaneously with the introduction of the

pointed arch, sometimes at a pitch of 60°, ultimately declining to about 20° or less in the late Perpendicular period. The outer covering is generally of boards overlaid with tiles or sheet-lead, the latter being imperative in the low-pitched roofs. The whole of the covering is carried by *common rafters* or *spars* rising from the walls to the apex of the roof.

Plate X., Figs. 1 and 2, show two ordinary *principals* or *trusses*. These are in no sense Gothic, but are here given to more clearly explain the principles of roof construction. The common rafters (c.r.) bearing the covering are of light timber, tending to bend under the weight; to prevent this *purlins* (P.), stout beams, are placed at suitable intervals, and these are carried at their ends by the *roof trusses*. The *tie-beam* (t.b.) is the chief beam of the truss. The *principal rafters* (p.r.) are framed into it and into the heads of the *King* and *Queen posts*. In the *Queen-post-truss* the *collar* unites the Queen posts; *struts* and *cross-braces* complete the structure. In a properly constructed roof-truss all the stresses are neutralised in the truss itself, and the whole

framework rests as a dead weight upon the walls without any lateral thrust to force them out of the vertical. The King-post-truss is suitable to roofs up to 30 feet span, the Queen-post-truss to 40 feet.

Open timber roofs have their construction visible from the interior. Plate X., Fig. 8, shows a crude *Queen-post-truss* in an old Worcestershire church, in which the tie-beam has been chosen from a bent log so as to prevent its bending under the roof load. In the trusses (Plate X., Figs. 1, 2) the King and Queen posts act like the keystones of an arch, so that by bolting or strapping up with iron-work at points s.s. these *posts* are put into a state of tension, the tie-beam (t.b.) is pulled up to a *camber*, or curve, and is also in tension. In the crude Queen-post-truss (Plate X., Fig. 8) these conditions are reversed, for the tie-beam *supports* the Queen posts. In Plate X., Figs. 1 and 2, all the spaces in these trusses are triangular, a fact which ensures stability where the parts are of proper strength and properly united. Plate X., Fig. 4, is a trussed rafter roof requiring no purlins nor principal—each common rafter is a truss. This kind of roof is suitable

only to small spans; its weakest part is from a. to b.

In the roof-truss, or principal, the Gothic architects objected to the tie-beam as an obstruction to the sense of loftiness, so desirable in the church interior, and therefore invented the *hammer-beam* principal (Plate X., Fig. 7), which resembles a Queen-post-truss, having a collar and King post. The hammer-beams (h.b.) are substitutes for the tie-beam.

In this principal the space between the collar and the apex of the roof is satisfactorily trussed, but from the collar downwards the *Queen posts* (Q.p.) and *wall posts* (w.p.) with their *braces* (b.) become mere brackets supporting the small King-post-truss above, bringing its load as low as possible on to the walls, so that their weight of masonry and buttresses may effectually resist the lateral thrust of the roof upon them.

Plate X., Fig. 5, shows a *collar* principal with curved braces. The tendency of all roof principals is to *spread* at the walls; this has been met by modern church-builders by introducing an iron tie-rod in place of a tie-beam, thus forming a triangle, the only form of absolute stability, for the whole of the prin-

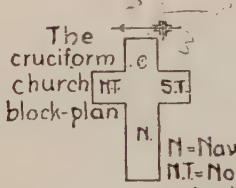
cipal, as indicated by the dotted line connecting the hammer-beams in Plate X., Fig. 7.

Plate X., Fig. 6, shows a low-pitched Perpendicular roof with principals and half-principal. The common rafters are concealed by a panelled ceiling, the panels being formed by principal rafters and purlins. The arched trusses bring part of the thrust low down on to the walls, which are strengthened by heavy buttresses on the outside. The *half-principal* is placed over a window arch.

Plate X., Fig. 3, shows a low-pitched roof and ceiling supported by a tie-beam only, strengthened at its bearings by *wall posts* and *braces.*

PLATE XI

GOTHIC VAULTS

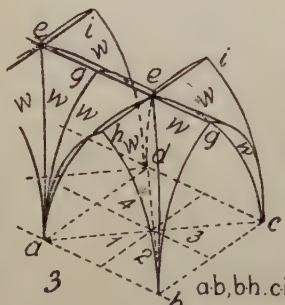


1

N=Nave
N.T.=North-transept
S.T.=South-transept
C=Choir

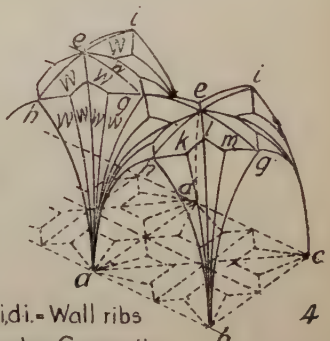
2

C=Clerestory
T=Triforium
G=Groundstory
Elevation of a bay of a Cathedral.



3

Quadripartite Vault.



4

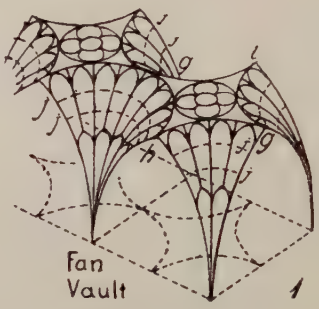
Lierne Vault.

a·b, b·h. c·i, d·i. = Wall ribs
b·g, c·g. a·g, d·g. = Cross ribs
be, de. ae, ce = Diagonal ribs
w = web.

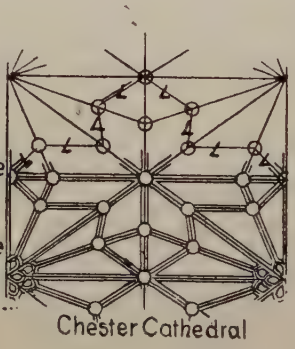
PLATE XI

PLATE XII

GOTHIC VAULTS



The dotted arcs j show horizontal joints, there are no supporting ribs.



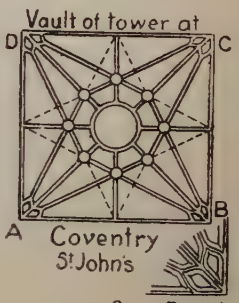


PLATE XII

Plates XI and XII

GOTHIC VAULTS

STONE-VAULTED roofs became necessary in church building early in the Norman period for security against fire. They were made after the Roman manner, semicircular, with similar vaults intersecting at right angles. The lines of their intersections are the *groins*. When two intersecting vaults are of equal semicircles, each groin is a semi-ellipse. This groin is the weakest part of the vault; in order to strengthen it the Normans built an arch called the *groin rib*, underneath the groin, to support it. Difficulties were met in forming intersecting vaults of unequal span, clumsy contrivances were resorted to, until, in the Transition period, 1145-1190, the introduction of the pointed arch solved the problem, and led the way to the development of Gothic vaulting. The Roman and Norman vaults were built upon temporary *centering*. A *centre* is a timber frame made like a roof-truss shaped

to the form of the arch ; a series of *centres* were placed at convenient distances apart and covered with strong boarding upon which the vault was built. After the masonry was completely *set*, the temporary centering was removed, leaving the vault to carry itself.

As the system of vaulting developed, *cross ribs* and *wall ribs* (Plate XI., Fig. 3) were added, and much of the temporary centering was dispensed with ; ornamental arrangements were designed by introducing more ribs, and *the web*—the covering surface of masonry—was reduced to small panels in the Decorated and Perpendicular periods. In the Tudor period, 1485-1558, the *web* became the principal part, the ribs being mere mouldings worked upon its surface in the form of *fan-vaulting*, a simple example of which can be studied in the south porch of Chester Cathedral, and the most elaborate in the roof of the Chapel of Henry VII., Westminster Abbey.

A *bay* of a cathedral is one of the spaces into which its length is divided by the supports of the roof as piers, arches, or principals. The bays of the aisles are usually square—those of

the nave, choir, or transepts rectangular on account of their greater width.

Vertically each of the bays of the nave, etc., is divided into three stories (Plate XI., Fig. 2), the *groundstory* rising from the floor ; the *triforium*, or *blindstory*, having no windows, is over the aisles, and the *clerestory* over the triforium. The prefix *clere* — bright — indicates the brilliancy of its light.

In the Norman period these three divisions were nearly equal in height. In the succeeding periods the groundstory attained about half of the total height of the bay, the clerestory was extended downwards, and the triforium reduced, until, in the Perpendicular period, it entirely disappeared.

Plate XI., Figs. 3 and 4, show a few square bays of Gothic vaulting in skeleton diagrams with the forms of plan indicated by dotted lines upon their base-planes. All the lines represent ribs.

Plate XI., Figs. 2 and 3, show *quadripartite* vaulting—*i.e.*, having four compartments in one bay. This is the simplest form of Gothic vault, and belongs chiefly to the Early English period. The ribs ah, bh, ci, di are wall ribs ;

bg, cg, ag, dg, are cross ribs; ae, ce, be, de, are the diagonal ribs. The ridge-ribs eg and h, e, i, are horizontal, and intersect the summits of the cross ribs and diagonals. At every intersection there is generally a carved keystone or *boss*.

In the vaulting of a nave the breadth across is about twice the breadth of the aisles, so that the nave bays are not square, but rectangular.

Plate XI., Fig. 4, and Plate XII., Fig. 2, show *lierne*-vaulting, having *lierne-ribs*, the short ribs joining and supporting all the ascending ribs as h, k, l, m, g.

Plate XII., Figs. 2 and 3, are lierne vaults. That shown in Fig. 3 is under the belfry of a church tower at Coventry, with circular opening for hoisting the bells.

The detail at B shows the method of collecting the three ribs into one at the *springers* in the corners A, B, C, D, by small arches in the tracery of ribs.

Plate XII., Fig. 1, shows fan-vaulting having no ribs. The lines shown indicate mouldings on the masonry imitating ribs. The structure is built up of slabs of stone, accurately joined

together forming concave half-cones, their vertices being the springers of the vault. The dotted lines show some of the jointing; the other lines represent the imitation ribs. The crown of the vault is the flat surface gh, gi, generally richly ornamented.

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